

# FOCUS

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy

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*“This innovative energy-storage plant is designed to improve power reliability and customer service, have limited environmental impact, and contribute to economic growth for consumers in Mississippi and throughout the Tennessee Valley.”*

— Glenn McCullough, Jr.  
Chairman of Tennessee  
Valley Authority

## TVA Power-Storage Facility to Improve Power Reliability

To meet peak energy needs and improve power quality, the Tennessee Valley Authority (TVA) is building the nation's first large-scale, energy-storage facility north of Columbus, Mississippi. The plant, now under construction, will store electricity during off-peak periods, and retrieve it for use when the need for power increases or when a major TVA grid service line outage occurs affecting Columbus Air Force Base and 4-County Electric Power Association customers living near the base.

Located adjacent to Columbus Air Force Base, the facility is designed to store up to 120 megawatthours of energy. Once fully operational, it will be capable of providing power to approximately 7,500 homes for 10 hours or more. Construction is expected to be completed by the summer of 2003 with a start-up and testing period to follow. Designed and developed by Regenesys Technologies Limited™ of the United Kingdom, the plant's technology is based on regenerative cells that store energy through an electrochemical exchange process.



Artist rendering of the Tennessee Valley Authority's Columbus energy storage facility.

“This innovative energy-storage plant is designed to improve power reliability and customer service, have limited environmental impact, and contribute to economic growth for consumers in Mississippi and throughout the Tennessee Valley,” said TVA Chairman Glenn McCullough, Jr. “TVA continues to set the pace for energy production and demonstrate its role as a national leader in the use of cutting-edge, 21st-century technologies.”

The energy storage plant will store or release energy by means of a reversible electrochemical reaction between two salt solutions. The system will use electrolytes in

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## **TVA POWER-STORAGE FACILITY TO IMPROVE POWER RELIABILITY**

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concentrated solutions of sodium bromide and sodium polysulphide. During periods of low demand for electricity, the plant will be “charged” by a chemical process pulling power from the main TVA grid source. The process reverses itself to release and transmit the stored energy when demand for power rises.

Energy storage technology offers power supply flexibility, in addition to technical and financial benefits. The financial benefits accrue from more efficient use of plant generation, transmission, and distribution, and the technical benefits are derived from improved system performance. The demand for electric power can fluctuate widely from season to season and throughout the day. But peaks in energy demand may only last for a few hours in a year, yet power stations must maintain the capacity to meet the largest of these peaks. Typically, the average demand for electricity is about 60 percent of maximum demand. When backup-generating capacity is taken into account, the average utilization of power plants is only 50 percent of their capacity. One way to improve power plant utilization and reduce expensive backup and peaking capacity is through the storage of energy during periods of low demand for use during periods of high demand.

Stored energy would provide a reliable, near uninterruptible power source, improve power quality, and allow TVA to take advantage of storing energy during daily load cycles. The system would also improve utilization of power plants that are currently cycled on and off to meet fluctuations in demand. Readily available, stored electric power could also provide voltage support, frequency regulation, and almost instantaneous response to major power outages. Finally, this source could defer the need for system upgrades.

For Columbus Air Force Base, home to the 14<sup>th</sup> Flying Training Wing of Air Education and Training Command’s 19<sup>th</sup> Air Force, keeping the base’s flight simulator facility running smoothly is vital to the base’s mission-critical operation. Pilot training is one of the primary missions of the base. The advanced flight simulators used in preparing pilots for duty are extremely sensitive to power voltage and phase-power quality. Interruptions in power to the simulators, as well as the base’s Precision Measurement Equipment Laboratory, would result not only in system downtime, but lengthy and costly recalibration and system maintenance requirements. Keeping these facilities running smoothly with consistent power from the new TVA energy storage facility would allow the base to help provide the airpower needed for our national defense.

“This project will generate value for our customers by reducing the need for high-cost generation during times of peak use,” said TVA Director Skila Harris. “It also helps us make more efficient use of available resources, demonstrating TVA’s commitment to excellence in business performance and public service.” The energy storage plant will be the second facility of this type in the world, and the first of its kind in the United States. The Regenesys Technologies™ plant will have the largest regenerative electrochemical cells ever built and operationally used for prime power redundancy.

*For more information, please contact Terry Johnson of the Tennessee Valley Authority at 256-386-3076 or [twjohnson@tva.gov](mailto:twjohnson@tva.gov), or Thomas Waller of Columbus Air Force Base at 662-434-7403 or [tom.waller@columbus.af.mil](mailto:tom.waller@columbus.af.mil).*

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# DOD Invigorates Utilities Privatization Effort

For several years the senior leadership of the Department of Defense (DOD) has sought to modernize DOD's \$50 billion utilities infrastructure by taking advantage of private sector innovations, efficiencies, practices, and financing. In a recent memorandum, Deputy Secretary of Defense Dr. Paul Wolfowitz reaffirmed DOD's commitment to privatize military utility systems. The memorandum initiated a concerted effort to strengthen and revitalize the privatization efforts of each Military Service.

Each Service has evaluated the business case for privatization of utility systems—a complicated process. During the last decade, much progress was made and many lessons learned. DOD is now poised to incorporate numerous improvements into its utilities privatization program.

In issuing the new guidance, the Deputy Secretary of Defense emphasized that “to achieve innovative results, privatization must proceed in a deliberate manner that promotes industry interest and competition to the maximum extent practical.” A utility privatization evaluation is being conducted on each electric, gas, water, and wastewater system at every Active, Reserve, and National Guard installation.

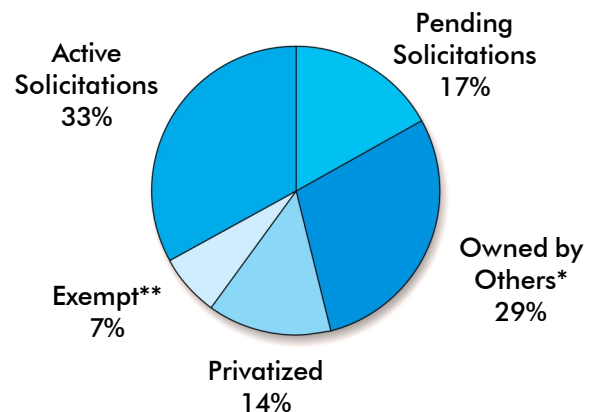
Solicitations for privatization are out for nearly 860 military utility systems with approximately one-half of those solicitations pending the receipt of proposals (see pie chart on right). Each Service maintains a web site detailing the status of those acquisitions, which can be accessed through the DOD's Office of the Secretary of Defense (OSD) web site at [www.acq.osd.mil/ie/utilities/privatization.htm](http://www.acq.osd.mil/ie/utilities/privatization.htm). The OSD web site also includes the DOD's utility privatization guidance and other pertinent information on the DOD's utilities program. Solicitations on 450 additional utility systems will be released over the next 18 months, with all utility privatization evaluations completed by September 2005.

In the fall of 2001, Dr. Get W. Moy assumed the leadership of the Utilities and Energy Use Directorate. He said “Privatization is my number one priority. I want to be sure we obtain safe, technologically-current, and environmentally-sound utility systems, at a relatively lower cost than continued government ownership.” Dr. Moy regularly meets with the Services and industry representatives to share information about best practices and address challenges.

All long-term utility privatization costs and benefits to the Federal government are required in an economic analyses of the systems, and evaluated over the life of the utility service contract, which could last 50 years. Specifically, the analyses address Federal taxes, insurance costs, effects on the price of the commodity, and other financial impacts of privatization. To facilitate the economic analysis and determine the life-cycle costs and benefits of each proposal, OSD developed the Utilities Privatization Economic Analysis Tool (UPEAST). UPEAST can be downloaded at [www.acq.osd.mil/ie/utilities/privatization.htm](http://www.acq.osd.mil/ie/utilities/privatization.htm). This analytical tool has simplified the utility privatization evaluation process. The Services continue to establish partnerships with the utility industry and improve the accuracy of government estimates of utility service costs. After privatizing 375 systems, OSD expects to realize even greater benefits as the remaining utility systems are evaluated for privatization. Dr. Moy's message to industry is: “We are moving forward as rapidly as possible to privatize utility systems, and to do it right.”

For more information, please contact Captain Rick Marrs of the Department of the Navy at 703-697-6195 or [richard.marrs@osd.mil](mailto:richard.marrs@osd.mil).

## DOD Utilities Privatization



DOD has approximately 2,600 utility systems with one-half of those systems under evaluation for privatization.

\* Utility systems at overseas bases owned by host countries or in-country systems owned by another agency, municipality, or a private firm.

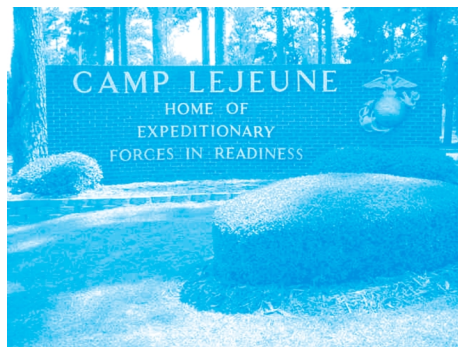
\*\* For unique mission or security reasons or privatization determined to be uneconomical.

# Camp Lejeune Creates Utilities Conservation and Appraisal Board

Marine Corps Base Camp Lejeune, North Carolina, is striving to establish itself as the energy conservation leader in the Marine Corps. As one of the most diverse installations in the Marine Corps with numerous commands, activities, services, and tenants, the base is the largest energy consumer in the Corps, comprising 25 percent of all Marine shore facility energy consumption.

To meet the base's energy reduction challenge and educate the vast base population, Camp Lejeune has established the Utilities Conservation and Appraisal Board (UCAB). Camp Lejeune's UCAB is an advisory board with direct access to the commanding general. "The UCAB is charged to create policy for a progressive utilities conservation plan for Camp Lejeune and Marine Corps Air Station New River," said Jerry Rowlands, energy engineer/awareness coordinator, Camp Lejeune.

Some potential energy resource management areas that the UCAB will address include fuel switching, plant modernizations, operations and maintenance innovation, and enhanced methods of reporting.



*The Marine Corps' Camp Lejeune and New River work to meet Federal energy reduction goals and educate the population of both bases with the formation of the Utilities Conservation and Appraisal Board.*

The primary duties of the UCAB include:

- ensuring that subordinate commands assign an officer or senior civilian for energy resource management;
- establishing and maintaining an active energy awareness program;
- publicizing energy goals and progress toward those goals;
- auditing energy use and determining how, where, and by whom energy is used; and
- assigning a "building energy monitor" to each building to inspect energy conservation methods implemented by building occupants and check equipment for needed repairs on a weekly basis.

"The goal of the program is to communicate with, and educate, the occupants on what they can do to increase energy conservation and to report any problems that need to be fixed," said Jim Sides, energy program manager, Camp Lejeune. Also "energy alert" e-mail messages are broadcast to lower energy consumption during high electricity price periods, and to educate Marines about the need for energy conservation. The alerts are circulated when electricity prices rise 3.5 times higher than the normal rate. This is determined by utility company "real-time market" pricing, which is established each day and is based on the utility company's calculation of system-wide demand and generation. The installations pay a fixed price for a set number of kilowatthours each day, anything more than that is charged at the real-time pricing rate. "When the messages come out, we do see decreases in energy used," said Sides. "The most dramatic decrease is at the end of the day; people turn more things off when there is an 'energy alert' than on a normal day."

UCAB meets quarterly and is chaired by the Public Works Resident Officer in Charge of Construction. The utilities director and energy program manager act in an advisory capacity to the UCAB.

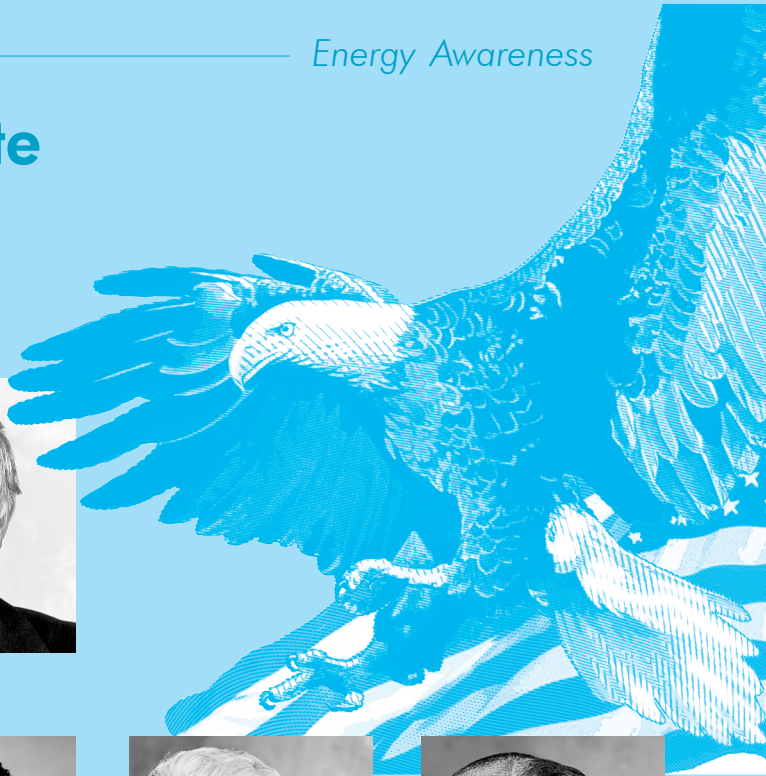
"Establishing the UCAB is another example of Camp Lejeune's dedication to the commitment made by the Commandant of the Marine Corps to achieve all Federal energy reduction goals," said Sides. Through an active energy management program, increased energy awareness at all levels, and aggressive use of innovative conservation technologies, and funding sources, Camp Lejeune is actively taking a base-wide representative approach to implementing Federal energy conservation policy.

For more information, please contact Jim Sides of Camp Lejeune at 910-451-5950, ext. 201, or [sidesjc@lejeune.usmc.mil](mailto:sidesjc@lejeune.usmc.mil), or Jerry Rowlands of Camp Lejeune at 910-451-5950, ext. 202, or [rowlandsjt@lejeune.usmc.mil](mailto:rowlandsjt@lejeune.usmc.mil).



# Federal Agencies Celebrate Energy Awareness

## Energy Champions Lead By Example



Phyllis E. Johnson, Ph.D.  
Agriculture



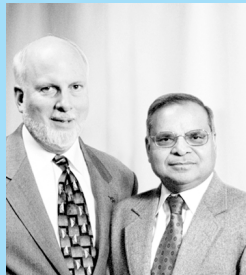
William G. King, Jr.  
Air Force



Dr. Mehdi Ghaderi  
Army



John Porter  
Commerce



David Eakin, PE  
Vijay Gupta, PE  
General Services Administration



Greg Leifer  
Health and Human Services



Cherie Schaefer  
Justice



Jackie McWain  
Labor



Douglas Thom  
National Aeronautics and  
Space Administration



Lawrence J. Schroeder, PE  
National Aeronautics and  
Space Administration



Bill Taylor  
Navy



James Trockle  
Navy



Scott Howard  
Social Security Administration



Stanley Lee  
Transportation



Ray Ryle  
Transportation



Elizabeth Lucas  
Transportation



Zoia Rose, Mark Zulim, Jones  
Tong, Claudia Montijo-Wentz  
Treasury



Debby Wilcox-Loos  
U.S. Postal Service

Agencies honored their Energy Champions during 2002 as part of the **YOU HAVE the POWER** campaign. Make energy awareness a priority throughout the year.

# Federal Agencies Distribute Posters on Special Projects to Increase Energy Awareness

Several agencies created posters featuring their own unique projects during 2002 as part of the *YOU HAVE the POWER* awareness campaign. The posters highlighted efforts that ranged from renewable energy power purchases, to sustainable building design, to solar power in Africa.

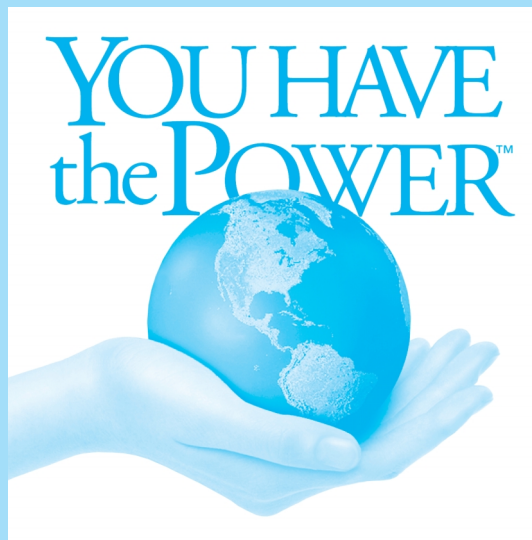
## Commercial Renewable Energy Contract

Edwards Air Force Base, California

U.S. Department of the Air Force



The Air Force accomplished a major procurement of green power at competitive rates. A mix of wind, solar, and biomass power provide 60 percent of the base's electricity load and save \$42 million over 5 years.



## Renewable Energy Initiative

U.S. Army Intelligence Center

Fort Huachuca, Arizona

U.S. Department of the Army



Installation of a 10-kilowatt wind turbine; solar walls; daylighting; solar thermal, photovoltaic collectors; domestic hot water; and a 200-kilowatt fuel cell reduce energy use by 3 million kilowatthours of electricity and more than 8 billion Btu of natural gas per year.

## Chilled Water Thermal Energy Storage System

Sandia National Laboratories

Albuquerque, New Mexico

U.S. Department of Energy



A facilities engineering team constructed a chilled-water thermal energy storage system and avoided the purchase of a new 900-ton chiller plant. Chiller operation during off-peak hours, efficiency improvements to the existing system, and reduced maintenance save \$200,000 annually.



*Make energy awareness a priority all year long.*



## Sustainable Building Design

EPA New England Regional Laboratory  
North Chelmsford, Massachusetts

General Services Administration and  
U.S. Environmental Protection Agency



*This facility incorporates xeriscaping, daylighting, photovoltaic window shades, efficient heating and cooling systems, tinted windows, modular gas boilers, water-cooled chillers, skylights, high efficiency motors, and other features. Energy savings are projected to be 45 percent over a typical laboratory facility.*



**Photovoltaic Installation**  
CARE/Centers for  
Disease Control - Safe  
Water Health Project  
Homa Bay, Kenya

U.S. Department of Health and  
Human Services

*A 2-kilowatt photovoltaic module supports the safe water health project in Homa Bay, Kenya. Money saved on generator fuel and maintenance is being redirected to the field station's important safe-water community activities.*

## Energy Conservation Initiatives

U.S. Geological Survey National  
Headquarters  
Reston, Virginia

U.S. Department of the Interior

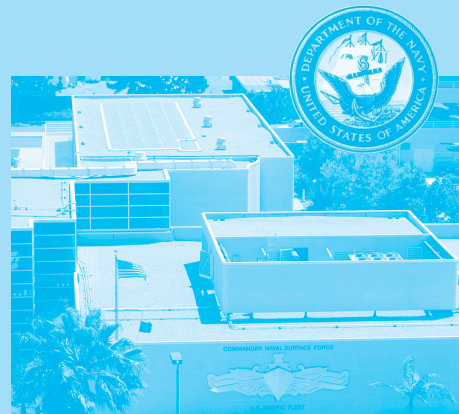
*Upgrades include chiller replacements and improved monitoring and controls, photovoltaic lighting, and three solar thermal tile systems that provide heated air to start generator engines in cold weather. Compared to their 1985 baseline, energy use dropped 18 percent and energy costs fell 23 percent.*



## Energy Conservation Initiatives

Naval  
Amphibious Base  
Coronado,  
California

U.S. Department of  
the Navy



*The energy team installed a 120-kilowatt micro-turbine cogeneration system for two pools and domestic hot water heating, a 30-kilowatt photovoltaic system, HVAC upgrades, base-wide HID lighting retrofits, and skylights with photocells, together saving the Navy \$340,000 in annual energy costs.*

## Geothermal System Installation

Laurel Bay and Pine Grove Housing Areas  
Marine Corps Air Station  
Beaufort, South Carolina

U.S. Department of the Navy



# Promoting Energy Awareness Saves Energy in Two Federal Workplaces

The State of Wisconsin's energy office and stakeholder teams from the U.S. Department of Agriculture/Forest Service's Forest Products Laboratory (FPL) and the William S. Middleton Memorial Veterans Affairs Medical Center (VAMC) used innovative approaches to promote energy saving behaviors among employees at Federal workplaces and find strategies that can be effective in other workplaces. FPL is a 275-employee facility of 430,000 square feet, one-third of which are laboratories and the remainder is office space. VAMC is an 850-employee three-shift facility of 600,000 square feet with 80 patient beds, research laboratories, clinics, and administrative areas. The FPL and VAMC included markedly different types of facility space, organizational cultures, and functions that allowed testing of a variety of approaches.

The project implementers realized it was important to understand and meet the needs of their coworkers. A project plan was developed in coordination with an internal stakeholder group from each facility, to achieve buy-in for the project, and to understand the technological and social dimensions of energy use that were unique to each facility. Surprisingly, the teams resisted traditional awareness approaches such as friendly competition between departments, lotteries, individual prizes, and pledges. Instead, stakeholders preferred approaches that did not spotlight one worker over coworkers, and minimized friction between departments, such as rewards to the entire organization. The FPL team, with a workforce of many scientists, indicated that their coworkers were motivated by no-nonsense factual information on saving energy and the prospect of larger research budgets as a result. Both teams were also interested in using the FEMP *You Have the Power* energy-awareness slogan.

The project implementers interviewed building managers, conducted baseline "operational" audits to determine the best energy-saving opportunities, and focused on identifying opportunities for improving employee interaction with energy-using equipment. The project implementers identified the most important actions employees could take to save energy, including:

- turning off lights and computer monitors when leaving the office for extended periods of time,
- shutting off computers at night,
- activating power management on office equipment, and
- setting thermostats lower during the winter and higher in the summer before leaving work for the day.

At FPL, these actions were estimated to save \$30,000 per year, or enough energy to prevent 350 tons of carbon dioxide emissions a year. At VAMC, these actions were estimated to save \$50,000 per year and 690 tons of carbon dioxide emissions per year. The campaign focused on encouraging more employees to take these actions consistently at work.

The implementers conducted campaign launch events with awareness materials and exhibits demonstrating the benefits of energy efficiency. The campaign continued with ongoing activities, including daytime audits which evolved into "walk around" energy awareness sessions. Implementers encountered a challenge when reducing computer energy use with monitor power management software. This led to the pilot testing of a hardware alternative (Monitor Miser). The project was expanded to include other pilots of energy saving hardware that relate to occupant behavior.

The project also encouraged employees to save energy at home, carrying over the new energy awareness from the workplace. During Earth Week, each facility sponsored an on-site sale of compact fluorescent light bulbs, offered by local retailers. Employees enthusiastically participated, buying almost 3,000 ENERGY STAR® light bulbs for their homes.

The teams achieved significant energy savings by promoting energy awareness and changing workers' energy use habits. The project customized its approach for the specific conditions and opportunities in the participating buildings. Project elements included both technical assistance to operations and maintenance staff, and general educational outreach to all employees. The success of this project can be used as a model for similar projects in public and private workplaces. In fact, project results are being applied to several State and local government facilities.

For more information, please contact Barbara E. Smith of the Wisconsin Division of Energy at 608-266-7554 or [barbara.smith@doe.state.wi.us](mailto:barbara.smith@doe.state.wi.us), or Annie Haskins of FEMP at 202-586-4536 or [annie.haskins@ee.doe.gov](mailto:annie.haskins@ee.doe.gov).



# Sandia's Grassroots Energy Awareness Campaign Yields Big Savings

The Energy Management Program at DOE's Sandia National Laboratories has grassroots help from a semi-anonymous senior scientist who calls himself "the Energy Nag." The Energy Nag has been rankling the 250 occupants of his building since summer 2001 with mass e-mails, an online newsletter called *The Nag Rag*, and uninvited office visits.

He has been urging coworkers to switch off unneeded lights, lower thermostats when possible, switch office equipment off at night, and even purchase 10-watt halogen desk lamps.

"If we adopt some simple and painless habits," he pleads, "we could make a huge difference in the amount of energy the laboratory uses." And they have. Occupants of Sandia's Building 810 have cut overall electricity use by 17 percent from August 2001 to July 2002. During this period, the energy savings in the 151,000-square-foot building at the Albuquerque, New Mexico, site totaled more than 825,000 kilowatthours and approximately \$43,000 in annual cost savings.

Energy reductions at Building 810 are estimated to be saving \$150 per person. According to Sandia's Energy Management Program, if 70 percent of Sandia's workforce could save an average \$50 per year per person in non-essential electric use, a 3 percent laboratory-wide reduction in annual electricity use would result.

"With very minimal pain, we've cut back about 41,000 kilowatthours per month

since this effort was launched," he wrote in a recent issue of *The Nag Rag*. "Not bad, but there is much more nagging yet to come."

When editors of *Sandia Lab News*, the laboratory's employee newspaper, found out about the Nag's efforts, they featured him, retaining the Nag's anonymity and allowing him to deride his coworkers on a grand scale. The Nag tells employees he believes saving energy is not only the right thing for the environment and taxpayer's dollars, it's also a national security issue.

The Nag's combination of sarcasm and wit has hit a chord with Sandia employees. His writings are inspiring nag "wannabes" to volunteer to nag their coworkers in buildings across Sandia.

As a follow up to the Nag's exploits, *Sandia Lab News* featured articles on energy-use statistics and energy-saving opportunities. The program coordinators further capitalized on the Nag's efforts by holding an energy awareness training session in September 2002 to kickoff National Energy Awareness Month and an energy conservation contest for FY 2003.

At the meeting, the neophyte nags were provided a brochure with energy-saving tips and supporting information, posters and other handouts, moral support, and an offer for more assistance, including energy usage information for their buildings. The FY 2003 contest challenges Sandia employees to compete

to reduce monthly per-square-foot electricity consumption.

At the end of each quarter, Sandia buildings with significant energy reductions are placed into the following categories—the 5 Percent Club, 10 Percent Club, 15 Percent Club, and the Overachievers Club. The building numbers and energy consumption reductions will be publicized in *Sandia Lab News*. Prizes will go to occupants of buildings with the highest overall reductions at the end of each quarter, and a grand prize will be awarded at the end of the year.

Sandia is a two-campus National Laboratory complex, with sites in Albuquerque, New Mexico, and Livermore, California, totaling more than 6.5 million square feet. Sandia has achieved a 34 percent reduction in energy use per square foot since FY 1985, mostly with technology improvements and efficient new buildings. Laboratory-wide energy awareness and behavioral changes have the potential for even more reductions.

For more information, please contact Ralph Wrons, Sandia's Energy Management Program Manager at 505-844-0601 or [rjwrons@sandia.gov](mailto:rjwrons@sandia.gov), or Malynda Aragon, energy contest coordinator at 505-844-1288 or [malarag@sandia.gov](mailto:malarag@sandia.gov).

## FEMP Helps Denali's Wonder Lake Ranger Station "Get Back to Nature"

Denali National Park and Preserve's Wonder Lake inspires images of tranquil, peaceful beauty. This isolated mountain lake in Alaska is cradled in a valley deep in the heart of the Park. For those who want to "get back to nature," Denali is an ideal place. But not too long ago, for Park employees and visitors at Wonder Lake Ranger Station, nature was less than peaceful, even 90 miles into the Park. A noisy 30-kilowatt diesel generator that powered the station and its buildings ran 24 hours a day, and a good night's sleep wasn't always possible. Guided by a sustainable design feasibility study funded with a technical assistance grant from FEMP, the National Park Service has achieved its goals to reduce electricity demand and emissions, eliminate fuel spills, and minimize noise levels at Wonder Lake Ranger Station.

Built in 1939 by the Civilian Conservation Corps, the historic ranger station serves visitors, and additional structures provide summer housing for Park staff. The site includes individual bunkhouses for the rangers, a headquarters building, a shop, a pump shed, and miscellaneous small structures. A staff of eight Park rangers occupies the station from mid-May to mid-September when the weather is less harsh. During these months, the employees depend solely on site-generated power to provide all of their electricity. At Wonder Lake Ranger Station, as in most remote areas of the Park, diesel is the primary fuel for electricity generation and space heating, as well as for Park vehicles. Noise pollution from generators

using diesel fuel resulted in a number of problems, including emissions of air pollutants, risks of ground contamination from spills, and high maintenance and repair costs.

Because duty at the Wonder Lake Ranger Station can be demanding and lonely, the Park Service is improving the "quality of life" for the rangers by making accommodations as comfortable as possible. Elwood Lynn, Chief of Maintenance at Denali National Park, wanted to improve the facility and save energy and costs, but he also wanted to incorporate sustainable design, construction, and renovation principles into the standard operating procedures for the ranger station. Lynn turned to FEMP for technical assistance concentrated on two fronts—reducing electric demand and replacing the power generation equipment with a more environmentally friendly system.

Using a 1999 DOE energy survey as a starting point, Mike Gregg, a member of DOE's Oak Ridge National Laboratory FEMP team, analyzed every point use of electric energy and the potential for fuel switching and load reduction. Gregg enlisted Hal Post of DOE's Sandia National Laboratories to visit the ranger station and report any additional details.

To provide site power, the FEMP team proposed a hybrid system consisting of a 12-kilowatt, propane-fueled generator augmented by a battery storage system. The Park Service opted to use a battery bank that limited the generator run-time to only 6 to 8 hours every fourth or fifth day to recharge the batteries, significantly reducing noise. The FEMP team also recommended that a small, four-module photovoltaic system be installed to trickle-charge the battery bank during the dormant period from mid-September until mid-May. "FEMP helped us quantify our loads and identify where we could reduce them, and helped us understand potential environmental savings using the hybrid system," Lynn reported. "For instance, some refrigerators, although purchased only 8 years ago, were considerably less efficient than new ones. FEMP helped us justify all of our appliance upgrades and the conversion from diesel to propane."



Wonder Lake, Denali National Park.

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## FEMP HELPS DENALI'S WONDER LAKE RANGER STATION "GET BACK TO NATURE"

*(continued from previous page)*

The project's installation cost was approximately \$45,000, and energy savings are estimated at 16.8 million Btu per year. The project reduced annual fuel consumption by 50 percent, or 2,500 gallons; exhaust emissions—carbon dioxide, sulfur dioxide, and nitrous oxide—were reduced by 34 tons, 119 pounds, and 52 pounds, respectively. Electricity usage was reduced by about 50 percent with a peak demand of approximately 11 kilowatts, down from 27 kilowatts. According to Lynn, while the station "... realized significant fuel savings through reducing loads and installing the hybrid power system, for the Park Service, the greater payback comes from the reduced maintenance requirements." Servicing the generator had required 4 hours of mechanic time every week. Due to the reduced run time on the generator, now it only needs to be serviced once during the 100-day season.

Additionally, FEMP's recommendation to switch fuels and install a hybrid propane fuel/battery system provided an elegant solution to the problems of exhaust emissions and soil contamination risks. The reduction in fuel consumption has reduced the amount of fuel that must be transported through the Park. The conversion to propane has eliminated the threat of soil contamination from spills and has significantly reduced exhaust emissions.

"We have a bunch of believers now," said Lynn. "At the start, they were sure that the system would significantly compromise their comfort. In fact, quite the opposite has occurred." He remarked that folks enjoyed the quiet so much that they asked if we could pursue funding to purchase additional solar panels so as not to run the generators at all.

The Park Service was able to become more energy-efficient, apply renewable energy technologies, strengthen its commitment to the environment, and embark on life cycle cost-effective operations, and is pleased to use this project as a model for future energy efficiency projects. "The entire Denali planning, design, construction, and operations and maintenance team were committed to making sustainability an integral part of this project and the credit goes to each member of the Denali National Park staff," added Arun Jhaveri of DOE's Seattle Regional Office FEMP Team.

*For more information, please contact Elwood Lynn of Denali National Park and Preserve at 907-683-9561 or [elwood\\_lynn@nps.gov](mailto:elwood_lynn@nps.gov); Mike Gregg of DOE's Oak Ridge National Laboratory at 865-574-5420 or [greggm1@ornl.gov](mailto:greggm1@ornl.gov); or Arun Jhaveri of DOE's Seattle Regional Office FEMP Team at 206-553-2152 or [arun.jhaveri@ee.doe.gov](mailto:arun.jhaveri@ee.doe.gov).*



Wonder Lake Ranger Station and outbuildings.



Hybrid power system consisting of propane-fueled generator, battery bank, and inverters inside generation/distribution building.



# NASA's Kennedy Space Center Gains Utility-Financed Infrastructure Improvements

The FEMP family joins NASA in honoring the memory of the crew of the Space Shuttle Columbia.

Colonel Rick D. Husband, USAF, *Commander*

Commander William C. McCool, USN, *Pilot*

Lieutenant Colonel Michael P. Anderson, USAF, *Payload Commander*

Captain David M. Brown, USN, *Mission Specialist*

Kalpana Chawla, Ph.D., *Mission Specialist*

Commander Laurel B. Clark, USN, *Mission Specialist*

Colonel Ilan Ramon, Israeli Air Force, *Payload Specialist*

Florida Power and Light (FPL) and the National Aeronautics and Space Administration (NASA) recently announced the completion of a \$3.1 million utility energy services contract (UESC) with NASA's John F. Kennedy Space Center (KSC) in east central Florida. The Space Center, with more than 700 facilities on site, is the primary NASA center for the launch of manned space vehicles, probes, and satellites. KSC also maintains and launches the Space Shuttle Orbiter Vehicles, supplies cryogenic propellants, and maintains payloads for joint missions. This historic national landmark and the nation's premiere launch site for manned space flight presented several opportunities to

upgrade existing facilities with modern energy-efficient systems and equipment.

The contract called for FPL to perform energy conservation measures and demand side management projects at several key Space Center facilities. FPL provided turnkey services for these projects including feasibility studies, design, construction, commissioning, and financing.

In total, the project is expected to reduce the Space Center's electrical consumption by more than 8 million kilowatthours per year—enough energy to power 670 new homes in Florida—and save the government \$442,500 in power costs

annually. In partnership with FPL and through other KSC-sponsored programs, the Space Center has been able to reduce its annual energy consumption by more than 20 percent compared to a 1985 baseline.

Working in high-security Space Center facilities with limited and restricted access and often vulnerable to work stoppages due to Shuttle processing and launch requirements, the system upgrades and efficiency measures were accomplished without interrupting the Space Center's mission critical operations. The project

*continued on next page*



*Kennedy Space Center's Vehicle Assemble Building - before and after lighting upgrades.*





## NASA'S KENNEDY SPACE CENTER GAINS UTILITY-FINANCED INFRASTRUCTURE IMPROVEMENTS

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included a variety of energy conservation measures in several facilities, described below.

### Solid Rocket Booster Assembly and Refurbishment Facility.

Refurbishment and sub-assembly of inert solid rocket booster hardware takes place in this facility. To provide better central chiller plant operations while lowering energy usage, FPL replaced and downsized the chiller plant's condenser water pumps used for cooling the complex's water distribution system. The chiller plant's two 200-horsepower compressed air systems required removal and replacement. In addition, the lighting systems throughout the facility were upgraded.

**Launch Control Center.** The Launch Control Center contains two primary and one backup control rooms. In this facility, FPL replaced the remaining T-12 fluorescent and incandescent lighting and magnetic ballasts.

**Vehicle Assembly Building.** The Vehicle Assembly Building supports the processing of rockets, shuttles, and payloads. This facility, one of the largest buildings by volume in the United States, is where the Shuttle is picked up vertically and mated with its external fuel tank and the two solid rocket motors and then placed on the mobile launch pad/crawler. Built in the early 1960s to support the Apollo Space Program, much of the interior infrastructure is original, including the lighting. FPL replaced nearly 60 percent of the existing lighting to better support Shuttle requirements and improve the color rendering properties by producing a bright, full-color light. A sophisticated control system providing multiple-lighting scenarios based on the actual facility

circumstances was installed. These energy conservation measures alone cut KSC's peak energy demand by more than 600 kilowatts saving a total of \$350,000 per year. Included as part of its demand side management programs, FPL provided NASA a \$46,680 rebate for lighting replacements.

**Orbiter Processing Facilities.** The Orbiter Processing Facilities are the "garages" for the Shuttles when they are not in flight. The Shuttles are overhauled, modified, repaired, and flight prepared in these structures. Access is tightly controlled and HVAC requirements are extremely critical. FPL provided HVAC modifications for the Space Center's three Orbiter Processing Facilities, improving the efficiency of the water side of the HVAC systems. Two other nearby facilities, a machine shop and communication repeater were modified and connected to the area's chilled water loop increasing cooling efficiency and avoiding expensive required equipment replacement and repairs.

In all, the KSC project took 12 months to complete and was third-party financed with a term of 10 years. The project reduced the Space Center's energy use by approximately 28 billion Btu per year helping KSC meet their energy goals. "Along with the reduction in energy, NASA now has an upgraded facility infrastructure and reduced maintenance costs," said Manuel Cabrera, lead power systems engineer, NASA Ground Systems.

*For more information, please contact Wayne Thalasinios of NASA at 321-861-8415 or wayne.thalasinios-1@kmail.ksc.nasa.gov; Manny Cabrera of NASA at 321-861-3283 or manuel.cabrera@ksc.nasa.gov; Ed Anderson of FPL at 321-726-4943 or ed\_a\_anderson@fpl.com; or Brad Gustafson of FEMP at 202-586-5865 or brad.gustafson@ee.doe.gov.*

## Your Alternative Financing Questions Answered

**Can you provide me with information about the DOE Bonneville Power Administration (BPA) financing mechanism?**

The Bonneville Power Administration (BPA), one of DOE's power marketing agencies, provides a wide range of technical support and a variety of project financing options. BPA is especially successful in bundling small projects with a pool of funding to obtain more favorable interest rates and signing interagency agreements to initiate projects as small as \$5,000. Agencies sign contracts with utilities as well as an agreement with BPA for the financing. BPA uses third-party financiers and establishes a pool of funds for contracts. Its financing program is available in most regions of the country.

BPA chooses Federal agency projects that cannot be served by customary financing methods. Because BPA uses government credit, interest rates are 150 to 180 basis points below private sector rates. BPA uses the lower rates to allow agencies with 10-year payment constraints to implement projects by adding lower financing costs, making the payback time acceptable.

BPA pools Federal agency financing requirements across regions, agencies, time periods, and technologies to get low cost financing from private sources. BPA's financing mechanism is flexible, which means that it can be mixed with agency funds, entrance fees, appropriations, utility incentives, and grants. The program can also be used for new construction, water conservation, and renewables projects with few constraints. Financing can be provided for up to 15 years, though payment terms of 2 to 12 years are preferred.

For additional information, please contact:

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Seattle, WA 98104-3636  
Phone: 206-220-6774  
E-mail: febrown@bpa.gov

*What questions do you need answered? FEMP wants to provide the most useful information possible, but we need your help to achieve this! Please submit your questions via e-mail to Tatiana Strajnic of FEMP at tatiana.strajnic@ee.doe.gov.*

## “Berkeley Lamps” Light Up NPS’s Golden Gate Facility

On a recent foggy afternoon in San Francisco, National Park Service (NPS) and DOE officials gathered at Fort Mason’s General Headquarters to celebrate the latest step in “greening” the National Parks.

The Golden Gate National Recreation Area, one of 385 National Park Service sites, installed 50 energy-efficient Berkeley Lamps in its offices at Fort Mason, with the assistance of DOE and the Environmental Energy Technologies Division of DOE’s Lawrence Berkeley National Laboratory (LBNL). The Berkeley Lamp, developed by lighting researchers at LBNL, reduces lighting energy use up to 50 percent in offices. The Golden Gate National Recreation Area is an urban National Park encompassing 75,500 acres in the San Francisco Bay Area. The Park contains such well-known sites as Alcatraz Island, Muir Woods, and the Presidio of San Francisco.

Steve Butterworth, the Park Service’s Regional Energy Manager, worked with LBNL lighting researchers Michael Siminovitch and Erik Page to determine whether the Berkeley Lamp would bring substantial energy savings to the facility. Their first collaboration was a handbook on energy-efficient lighting retrofits for NPS facilities managers.

“The project was originally funded as a standard lighting retrofit,” said Butterworth. “But by installing the Berkeley Lamp, we were able to avoid the expense and the waste stream of ripping out old fixtures, ballasts, and tiles, as well as the indoor air quality problems associated with the renovation. The cost to purchase the Berkeley Lamps was less than the labor would have cost in the original plan, and the waste stream from the new product packaging was also much less.”

### Park Service Commitment to Sustainability

“Our goal in the National Park Service,” said George Turnbull, Regional Coordinator of the Park Service’s Sustainability Program, “is not only to comply with, but to exceed the requirements of environmental regulations.” Turnbull added that installing Berkeley Lamps to lower energy costs was only one of many steps the NPS is taking to be a leader in environmental sustainability. Other projects underway or

completed include installing solar photovoltaic systems in Joshua Tree, the Mojave Reserve, and other Parks, as well as being the first to install a fuel cell in a National Park campground, replacing conventional- with biomass-based diesel power in the Channel Islands National Park, and awarding concessions based on vendor commitment to sustainability.

“We take sustainability seriously,” said Mai-Liis Bartling, the Acting Regional Director for the Golden Gate National Recreation Area. “We were the first National Park to request Berkeley Lamps, and now we have 50 of them. [The lamp] allowed us to bring energy-efficient lighting into a historic building. The feedback from the staff has been extremely positive. We want to expand the use of the lamp to other buildings.”

Butterworth added, “The public has been very supportive of our efforts at sustainability. Having these technologies in these public spaces helps educate people in how they can use the technologies themselves.”

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(left to right) Steve Butterworth, NPS; Marcy Beck, LBNL; Kathy Pierce, DOE; Mai-Liis Bartling, Golden Gate National Recreation Area; and George Turnbull, NPS; at a ceremony announcing the “re-lamping” of Golden Gate National Recreation Area’s Fort Mason General Headquarters building with Berkeley Lamps.

# HHS Indian Health Service Hospital Earns ENERGY STAR® Label for Buildings

The Environmental Protection Agency recently awarded a 2002 ENERGY STAR® label for buildings to the Department of Health and Human Services (HHS) Blackfeet Indian Health Service (IHS) Hospital in Browning, Montana. An ENERGY STAR® label for buildings is awarded for demonstrated energy performance in the top 25 percent among similar facilities nationwide (a rating of 75 or greater merits the ENERGY STAR® label). The Blackfeet Hospital earned this honor by maintaining indoor environment requirements for air quality, thermal comfort, and lighting, and has the distinction of being the first HHS building to receive the ENERGY STAR® label, “the mark of excellence in energy performance.”

The hospital was built in 1937, with additions constructed in 1960, 1986, and 2001. Most of the newer additions were designed with state-of-the-art variable-air-volume (VAV) and direct digital control (DDC) systems. Rob Smith, facility manager until 2000, developed a comprehensive preventive maintenance schedule, taking full advantage of the DDC systems to ensure that the facility was running efficiently. Since 2000, Tim Davis and his staff have focused on operating and improving the hospital's state-of-the-art systems, monitoring a DDC service contract, and adhering to a comprehensive preventive maintenance schedule.

In December 2001, Burke Helmer of the IHS Billings Area Office managed a project to commission the hospital's HVAC system. Later, Helmer compiled and recorded available utility data for three hospitals and two clinics in the Billings, Montana, area. Among the facilities, the Blackfeet Hospital maintained the lowest energy consumption per square foot. Earlier this year, he benchmarked the hospital's energy performance using EPA's ENERGY STAR® Portfolio Manager, a web-based performance rating system, which indicated that the facility scored high enough to earn an ENERGY STAR® label.

The Blackfeet Maintenance Department works to maintain the facility's high standards for indoor environmental quality and energy efficiency. The Blackfeet Hospital maintenance team includes: Terry Bremner, Maintenance Mechanic; Thomas Connell, Utility Systems Operator; Kevin Connolly, Utility Systems Operator; Stephen Conway, Utility Systems Foreman; Supervisor John DeRoche, Utility Systems Operator; and Ronald Lahr, Utility Systems Operator.

The ENERGY STAR® brass plaque will be displayed prominently in the Blackfeet Hospital. The plaque is a highly-visible symbol of excellence in energy performance and stewardship of the environment, and it conveys performance excellence to staff, patients, and other visitors. The ENERGY STAR® label sends a positive message that the Blackfeet Hospital is setting high standards in energy efficiency and saving our Nation's valuable natural resources.

For more information, please see the ENERGY STAR® Labeled Buildings web site at [http://yosemite1.epa.gov/estar/business.nsf/content/building\\_profiles.htm](http://yosemite1.epa.gov/estar/business.nsf/content/building_profiles.htm). ENERGY STAR® Portfolio Manager is available at [www.energystar.gov](http://www.energystar.gov) by clicking on “Government” and then “Benchmark Your Building.” For additional information, please contact Burke Helmer of IHS Billings Area Office at 406-247-7088 or [burke.helmer@mail.ihs.gov](mailto:burke.helmer@mail.ihs.gov), or Beverly Dyer of FEMP at 202-586-7241 or [beverly.dyer@ee.doe.gov](mailto:beverly.dyer@ee.doe.gov).



## LBNL'S BERKELEY LAMP LIGHTS UP NPS'S GOLDEN GATE FACILITY

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DOE's Regional Director Kathy Pierce said “It's wonderful to see an energy-efficient technology developed at one of the National Laboratories put to use by Federal agencies. It demonstrates that you can get anything done when you have good partners—people who are motivated to make something happen. We are looking forward to continuing our partnership with the National Park Service to support energy efficient and sustainable technologies.”

Visitors peering through the San Francisco fog can now see the warm yellow glow of Berkeley Lamps in the windows of the Fort's Headquarters building—a new beacon, one that represents energy efficiency and sustainability.

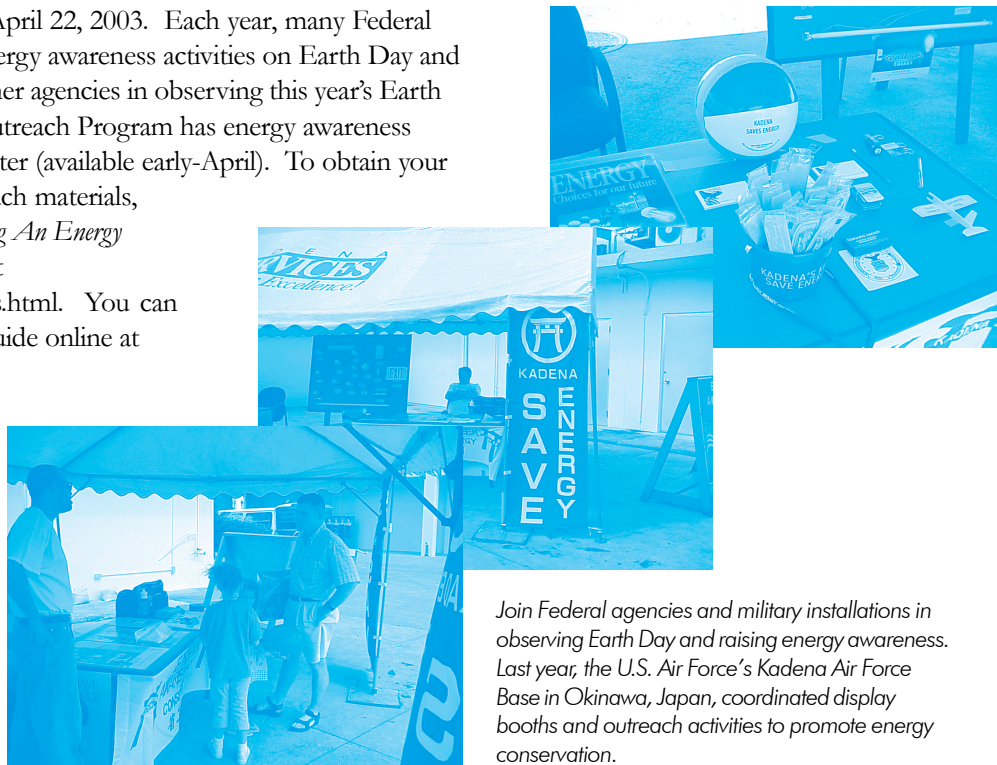
For more information, please contact Allan Chen of LBNL at 510-486-4210, or [a\\_chen@lbl.gov](mailto:a_chen@lbl.gov), or Chris Powell of the Golden Gate National Recreation Area at 415-561-4732 or [chris\\_powell@nps.gov](mailto:chris_powell@nps.gov).



## Plan Now for Earth Day

It's time to get ready for Earth Day—April 22, 2003. Each year, many Federal agencies hold environmental and energy awareness activities on Earth Day and throughout the month of April. Join other agencies in observing this year's Earth Day activities. To assist you, FEMP's Outreach Program has energy awareness materials including a new Earth Day poster (available early-April). To obtain your copy of the new poster and other outreach materials, including FEMP's outreach guide *Creating An Energy Awareness Program*, download the guide at [www.eren.doe.gov/femp/yhttp/strategies.html](http://www.eren.doe.gov/femp/yhttp/strategies.html). You can also order awareness materials and the guide online at [www.eren.doe.gov/femp/ordermaterials.html#awareness](http://www.eren.doe.gov/femp/ordermaterials.html#awareness) or by calling DOE's Energy Efficiency and Renewable Energy (EREC) Clearinghouse at 1-800-363-EREC. Please let *FEMP Focus* readers know about your Earth Day activities by submitting your project descriptions to [Annie.Haskins@ee.doe.gov](mailto:Annie.Haskins@ee.doe.gov).

For more information, please contact Annie Haskins of FEMP at 202-586-4536 or [annie.haskins@ee.doe.gov](mailto:annie.haskins@ee.doe.gov).



Join Federal agencies and military installations in observing Earth Day and raising energy awareness. Last year, the U.S. Air Force's Kadena Air Force Base in Okinawa, Japan, coordinated display booths and outreach activities to promote energy conservation.

## FEMP Energy Awareness Study Now Available

*Environment and Behavior* journal recently published the results of FEMP-sponsored research on promoting energy awareness behavior in military housing. The journal article entitled "Motivating Residents to Conserve Energy Without Financial Incentives" describes energy conservation campaigns at the U.S. Army's Fort Lewis in Washington and Marine Corps Air Station Yuma in Arizona. (See "Promoting Behavior-Based Energy Efficiency in Military Housing," *FEMP Focus*, January/February, 2000.)

Residential energy-usage behavior on military installations represents a potential significant source of energy conservation. Housing at some military installations can account for up to 30 percent of total installation energy costs. The FEMP study demonstrates the feasibility of tailored, research-based strategies to promote energy conservation in military family housing. The study examines customized intervention efforts where residents do not pay their own utility bills—measuring before-and-after energy use, and surveying residential end-use behaviors.

For more information, please see McMakin, A.; Malone, E.; and Lundgren, R.; "Motivating Residents to Conserve Energy Without Financial Incentives," *Environment and Behavior*, Volume 34, Number 6, November 2002, pp. 848-863. For additional information, please contact Elizabeth Malone of DOE's Pacific Northwest National Laboratory at [e.malone@pnl.gov](mailto:e.malone@pnl.gov).

## 2003 Awards Criteria for Saving Energy at Federal Facilities

The criteria and guidelines for the 2003 Presidential Awards for Leadership in Federal Energy Management and the 2003 Federal Energy and Water Management Awards are available at [www.eren.doe.gov/femp/prodtech/successstories.html](http://www.eren.doe.gov/femp/prodtech/successstories.html).

Full details will be available in the March/April 2003 *FEMP Focus* or contact Nellie Tibbs-Greer of FEMP at [nellie.tibbs-greer@ee.doe.gov](mailto:nellie.tibbs-greer@ee.doe.gov).



# FEMP Conducts First Resource Efficiency Manager Workshop

Various initiatives are underway within the Federal sector to reduce the size of the Federal workforce. Yet Federal facilities must be maintained at the necessary level to support ongoing or future mission activities and meet mandated energy reduction goals. For some agencies, the approach has been either privatization or outsourcing of energy and facility management functions to private organizations. A technique now being utilized by the Department of Defense, the U.S. Postal Service, the National Oceanic and Atmospheric Administration, and the Department of Energy to meet this need is the creation of a resource efficiency manager position (REM) for their site or group of sites.

An REM is similar to an energy manager or energy coordinator, with a few key differences. Typically, the REM is an additional staff member brought in to serve as a full-time resource manager and supplement current facility staff. The REM is able to devote much more time to developing and implementing a first-rate energy efficiency program. The other key difference is that the REM's salary is typically paid from the savings achieved. The U.S. Army's Fort Lewis in Tacoma, Washington, was the first REM site and its program has been operating for several years. The concept has grown within the Federal sector and now there are almost 25 REMs in place at Federal sites.

During FY 2002, various organizations with experience in creating and maintaining REM programs (including DOE's Seattle Regional Office, Washington State University's Energy Program, DOE's Pacific Northwest

National Laboratory, U.S. Naval Facilities Engineering Command—Southwest Division, and Tetra Tech, Inc.) worked together to develop the first REM workshop held in San Diego, California, on October 29 and 30, 2002. The goal of the workshop was to provide training on the REM concept and activities so agencies could evaluate the concept for implementation at their sites. The workshop also brought together most of the current REMs for further training and networking.

A total of 50 participants representing the Department of Defense, the Department of Energy, investor-owned utilities, gas companies, universities, and private industry attended the workshop which was held in the offices of San Diego Gas & Electric. The workshop consisted of 13 training modules and four case studies of on-going REM programs. The training modules included background on the REM approach and the following subjects:

- defining the role of the REM;
- using energy information systems;
- identifying and developing projects;
- developing training and awareness programs for on-site staff;
- accessing resources available from FEMP;
- accessing incentive programs, and customer service and sustainability resources;
- financing energy projects;
- an update on currently available technologies and information on emerging technologies; and
- how to contract for a REM.

## Plan Now for March 2003 FEMP Teleworkshops

FEMP's free updated "Energy Management Telecourses" will take place March 4, 11, and 18, 2003. These courses use state-of-the-art distance learning technology. The information presented is designed to assist facility management personnel in achieving EPACT and Executive Order 13123 objectives for energy and water savings and alternative financing. Using an interactive format, brief lectures will be followed by live question and answer sessions, problem solving, and web references. All three sessions are from 12 - 4 p.m., EST:

- March 4 - Part 1: Life-Cycle Costing - Basic; Buying Energy Efficient Products.
- March 11 - Part 2: Operations and Maintenance Management; Water Resource Management.
- March 18 - Part 3: Energy Savings Performance Contracting; Utility Energy Services Contracting.

Register now at [www.energyworkshops.org/femp/](http://www.energyworkshops.org/femp/) or call 865-777-9869. If you need help finding a downlink location or if you wish to sponsor a downlink site, please send an e-mail to [hbs@icx.net](mailto:hbs@icx.net) or call Heather Schoonmaker at 865-777-9869.

The case studies addressed on-going REM programs for both single and multiple sites.

Input and evaluation from the October workshop attendees is being used to modify current presentation material for a second REM workshop to be conducted in the Southeast during spring 2003. Information on upcoming workshops will be available on the calendar of events page of FEMP's web site or can be obtained from DOE's Atlanta Regional Office.

To learn more about the REM program, please see [www.energy.wsu.edu/ten/](http://www.energy.wsu.edu/ten/). For more information on FEMP's REM workshop, please contact Cheri Sayer of DOE's Seattle Regional Office at 206-553-7838 or [cheri.sayer@ee.doe.gov](mailto:cheri.sayer@ee.doe.gov) or Ab Ream of FEMP at 202-586-7230 or [ab.ream@ee.doe.gov](mailto:ab.ream@ee.doe.gov).

## Mark Your Calendar for FEMP's Super ESPC Workshops

Join other Federal government personnel and learn about Super Energy Savings Performance Contracting, a DOE/FEMP solution for Federal agencies that want to save thousands of dollars in capital costs while reducing long-term energy and water bills. Attendees will learn how to issue delivery orders against regional or technology-specific indefinite-delivery, indefinite-quantity contracts. You will also find out about delivery order requirements, preparation of technical portfolios, and proposal evaluation.

The workshops are free to Federal employees in energy management, engineering, and procurement. So that your agency can get the most out of these informative courses, invite your procurement and technical specialists to join you. The workshops are designed and taught by regional experts from DOE and the DOE's National Laboratories.

Upcoming workshops are scheduled for:

May 20-21 — Indianapolis, Indiana.

July 22-23 — Washington, D.C.

For more information or to register, please call the FEMP Workshop Hotline at 703-243-8343.

## FEMP Training Reminders

### High Performance, Low Energy Laboratory Design Workshop

March 4, 2003

Chicago, IL

[www.epa.gov/labs21century/training/](http://www.epa.gov/labs21century/training/)  
781-674-7374

### Energy Management Telecourse: Part 1

(Life-Cycle Costing-Basic; Buying Energy Efficient Products)

March 4, 2003

[www.energyworkshops.org/femp](http://www.energyworkshops.org/femp)  
865-777-9869

### Energy Management Telecourse: Part 2

(O&M Management; Water Resource Management)

March 11, 2003

[www.energyworkshops.org/femp](http://www.energyworkshops.org/femp)  
865-777-9869

### Energy Management Telecourse: Part 3

(ESPC; UESC)

March 18, 2003

[www.energyworkshops.org/femp](http://www.energyworkshops.org/femp)  
865-777-9869

### High Performance, Low Energy Laboratory Design Workshop

March 19, 2003

Princeton, NJ

[www.epa.gov/labs21century/training](http://www.epa.gov/labs21century/training)  
781-674-7374

### Design Strategies for Low-Energy, Sustainable, Secure Buildings

March 26-27, 2003

San Diego, CA

[rparadis@sbicouncil.org](mailto:rparadis@sbicouncil.org)  
202-628-7400, ext. 201

## Conferences

### Power Systems 2003 Conference

March 12-14, 2003

Clemson, SC

[www.ces.clemson.edu/powsys2003/](http://www.ces.clemson.edu/powsys2003/)  
1-888-654-9020

### Building Energy 2003 Conference and Trade Show

March 12-15, 2003

Boston, MA

[www.nesea.org/buildings/be/](http://www.nesea.org/buildings/be/)  
413-774-6051

### National Facilities Management and Technology Conference/Exhibition

March 18-20, 2003

Baltimore, MD

[www.nfmt.com](http://www.nfmt.com)  
630-271-8210

### Distributed Generation and On-Site Power Conference

March 24-26, 2003

Houston, TX

[www.dist-gen.com/](http://www.dist-gen.com/)  
508-823-5797

### Electro Expo – Power/Lighting/Communication 2003

March 26-27, 2003

Cleveland, OH

[www.electroexpo.info/](http://www.electroexpo.info/)  
216-221-8370

### Globalcon 2003

April 2-3, 2003

Boston, MA

[www.aeecenter.org/globalcon/](http://www.aeecenter.org/globalcon/)  
770-447-5083

### EnvironDesign 7

April 30 - May 7, 2003

Washington, DC

[www.isdesignet.com/ED/](http://www.isdesignet.com/ED/)  
561-627-3393

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